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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from $1.00 to $2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed by parcels post. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN

FORESTER & AGRICULTURIST

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POINTS ABOUT TIMBER FLUMES.

That the V-shaped timber flume is a more efficient type than the box or square-sided form is one of the conclusions reached by the department of agriculture in a bulletin just issued on flumes and fluming. The V-shaped wooden flume requires less water and, on the average, less repairs than the other type, is better adapted to act as a slide on steep grades, and offers fewer chances for jams. Concerning a third type, the "sectional" metal flume, semicircular in form, the prediction is made that it will come into wide use. Such a flume is strong and light, and can be quickly taken apart and transported from one place to another to be set up again.

When building flumes a good plan, says the department, is to erect a small sawmill at or near the upper end of the flume location to saw out the lumber needed for construction. Such material can be floated down the flume as fast as the latter is built and used for further extension.

For handling railroad cross-ties, cants, poles, cordwood, and the like, a flume with the sides of the V 30 inches in height is large enough. For handling logs, piling, long timber, or brailed sawed lumber, a height of from 40 to 60 inches is recommended. The best angle for the V is put at 90 degrees.

Proposed flume lines ought to be surveyed as carefully as a line for a logging railroad, to ensure evenness of grade. Grades should be kept below 15 per cent wherever possible, and the best results are obtained with grades between 2 and 10 per cent.

Abrupt curvatures in a flume should be avoided, for they are likely to cause jams. Curves should rarely be permitted to exceed 20 degrees. It may be necessary to blast out rocks and boulders, or projecting points of bluffs, or to trestle, or even tunnel, to eliminate abrupt curves or maintain an even grade.

Telephones are recommended as adjuncts to the operation of a flume. By their use a serious break or jam can be reported immediately to the head of the flume to prevent further shipment of material. A telephone also makes it possible to notify the men at the upper end of the flume just what material to ship and when to ship it.

A flume recently built on Rochat Creek, near St. Joe, Idaho, is cited as a good example of modern V-shaped flume construction. This flume, which is unusually large and built to handle heavy logs and long timbers, is said to have cost approximately $8000 per mile for the five miles of its length, including the cost of constructing a wagon road and telephone equipment. Other flumes are cited costing from $2000 to $7500 a mile.

Dr. Norgaard's report for June contains matter that should be worth a great deal of money to intelligent hog raisers. It is a feature of this number of the Forester which has permanent value.

Accomplishment is of infinitely more value than agitation. What the Territorial veterinarian shows, in his May report delayed in publication here until now, regarding the check that has been given to tuberculosis among children in the municipality of Honolulu through the outlawing of diseased milk, forms a telling example of the value of decisive measures in fighting the plagues of humanity.

Dr. Norgaard should have all the backing he requires, from both the authorities and public-spirited citizens, in his campaign against filthy dairies and dirty milk therefrom.

Mr. Hosmer's review of his service in the Division of Forestry, reprinted in this number from a local daily, will interest friends of forestry abroad as well as here.

MR. HOSMER REVIEWS HIS WORK IN HAWAII.

Before leaving Honolulu to take up his new position, that of head of the Forestry School of Cornell University, Mr. Ralph S. Hosmer by request furnished the Honolulu Star-Bulletin with the following review of his work as Superintendent of Forestry of the Territory of Hawaii:

"During the past ten years the division of forestry has stood consistently for two main objects—(1) the protection and proper administration of the native Hawaiian forest on the important watersheds, and (2) the planting of economically valuable trees on non-agricultural and other waste land.

IMPORTANT ACHIEVEMENTS.

"The more important achievements of the division may be summed up as follows:

"The creation of a forest reserve system and the laying of the foundation for a proper administration of the forest reserves.

"A decrease of trespass on the forests by the extension of forest boundary fences, the eradication of wild cattle and goats in most of the reserves, and the awakening of public opinion as to the importance of these measures.

"The securing of general assent to the doctrine of tree planting on waste land, as evidenced by the establishment of many groves of trees and forest plantations throughout the Territory.

"An increase in popular knowledge and appreciation of certain valuable trees, and the keeping up of the agitation of the subject of the importance of systematic investigations with new trees and shrubs.

"The carrying on of a campaign of education as to the value and necessity of practicing forestry in these Islands, and further as to the intimate relation which the right use of the natural resources—popularly known as 'Conservation'—bears to the continued economic well-being of this Territory.

"The enactment of a forest fire law and the organization of a forest fire service.

"And some share in the strengthening of the general public sentiment in favor of forestry and forest work that has found expression in continued and increased support by the legislature.

PROTECTION OF FORESTS.

"The protection of the areas of native Hawaiian forest covering the important watersheds throughout the Territory has been sought through the creation of forest reserves. The essential object is to equalize and maintain the flow in the streams that feed the various ditch systems which make the water available for irrigation, power development, cane fluming and domestic supply. There are now 37 forest reserves owned in Hawaii. These reserves include both government and privately-owned land. The total area is 798,214 acres, of which 546,222 acres (68 per cent) belongs to the Territory. Twenty-eight of the reserves are essentially protection forests, primarily of value for safeguarding the cover of vegetation on watersheds. The other nine, almost all government land, were set apart that the areas included within their limits might eventually be brought under forest, or that the commercially valuable timber on them might be administered under the board of agriculture and forestry.

SYSTEM NEARLY COMPLETED.

"Technically, the Hawaiian forest reserve system has now been pretty nearly completed. Only a few comparatively small lands remain to be set apart to round out the forest area needed for the protection of the important streams. What has so far been accomplished is essential as the first step in the program, but to

secure the full benefits to be derived from the protection of the forest it must be followed up by systematic administration of the reserves, such as can only be secured by a forest ranger service. The immediate forest problem in Hawaii and the next step in the progress of forestry in this Territory is to get an effective field organization established and in working order.

"In large measure the boundaries of the forest reserves either consist of natural barriers or are fenced. Some of the fences are maintained under the requirements of government leases, some have been built and are maintained at government expense, and some are kept up voluntarily by corporations or private owners. The more important corners of a number of the forest reserves have been marked with metal monuments. All the forest reserve boundaries ought to be so defined.

"During the past two years the government has constructed a number of new fences. Several other stretches of fence required under leases have also recently been completed, and some other lines of forest fence have been erected at private cost. The general attitude of the public in regard to the protection of the forest has undergone a marked change in the past decade. While there is still more or less trespass going on on each island, the best sentiment is now strongly against it, rather than being hostile or indifferent as was the case previously.

"In a few of the reserves the forest is still being damaged by wild cattle and by goats, but in the last few years a very marked improvement has been effected on each of the larger islands in controlling this form of injury.

TREE PLANTING ENCOURAGED.

"The second main line of endeavor pursued by the division of forestry since 1904 has been the encouragement of tree planting. This the department has sought to do by supplying technical advice to all who desired it as to methods and means of nursery and tree-planting work, but furnishing free or at cost price tree seedlings of various species, and by a general campaign of education as to the desirability of establishing blocks of planted forest from the standpoints of commercial return, watershed protection or aesthetic considerations.

"Tree planting has been practiced in Hawaii both by the government and by private individuals and corporations for 30 years or more, but in the past few years there has been a marked increase in the number of trees set out and a much better understanding of the necessity for such work than at any time before. The doctrine of using for tree planting non-agricultural land on the sugar plantations that otherwise would be classed as waste area has been persistently preached, until it is now generally ac-

knowledged to be a sound policy to follow wherever it is possible to secure funds to defray the initial cost.

"In this campaign much has been written and printed, in regular reports, in the Hawaiian Forester and Agriculturist and elsewhere, both as argument and exhortation, and also in the way of concrete examples showing the profit to be derived from tree planting in terms of compound interest. Among this matter the bulletin entitled 'Eucalyptus Culture in Hawaii,' by Mr. L. Margolin, calls for special mention. This report gives the result of a coöperative study made by the Division of Forestry and the U. S. Forest Service in 1910. That the efforts put forth have really told is evidenced by the increase in the number of trees planted each year. In 1912, the last year for which full records are at hand, the number planted was well over a million and a quarter trees. For the credit of creating this sustained interest, the division of forestry has the right to claim a share.

PRAISE FOR DAVID HAUGHS.

"In this connection it is only fair to make mention of the part played by the forest nurseryman of the division of forestry, Mr. David Haughs, who has charge of the section of the division's work dealing with the growing and distribution of trees. From his long experience in the Islands, Mr. Haughs' suggestions on all matters relating to tree-growing are distinctly worth having. That this fact is appreciated is proved by the steady stream of applications for advice that come to the division. Giving assistance of this sort is one of the important functions of this office. It is an essential part of the Territory's forest work.

"The introduction and experimental planting of trees new to the Islands is a branch of forest work which it has been the aim of the division of forestry to foster, ever since its organization. Only by the actual trial of new trees and shrubs can it be known surely whether or not they will succeed here under our local conditions. The division of forestry has helped to make better and more widely known several species that had previously been introduced, especially Japanese cedar, certain of the eucalyptus, and a basket willow from the Azores. It has as well developed the use of ironwoods as a windbreak for canefields near the ocean, and has started upon the investigation of many new trees about which it is yet too soon to have positive information to give out.

"The forest fire law in Hawaii dates from 1905. Under its terms a forest fire service consisting of volunteer district fire wardens has been organized and kept strictly up to date. This skeleton organization has been effective in combatting all fires that have occurred and furthermore has gone a long way toward firmly fixing in the minds of the people generally that the Board of Agriculture and Forestry means business in its enforcement of

the terms of the forest fire law. A number of convictions have been secured, especially during the past three or four years, where fires had been allowed to escape through preventable carelessness. This action has had a salutary effect in certain sections of the Territory where the danger from fire was high.

"Very fortunately, Hawaii has suffered but little from forest fires. But in the leeward districts and in occasional dry years even in those normally subject to heavy rainfall, the danger of fire is always present. The time to make ready for fighting fire is before it starts. Hawaii is prepared.

RECOMMENDATIONS.

"Just how soon it will be possible to establish a regular service of forest rangers, paid by and responsible solely to the Board of Agriculture and Forestry, is a question of financial policy. But until such a force of efficient men is organized to patrol the reserves, prevent trespass, see that the fences are maintained, exterminate the remaining wild stock in the forests, and prevent forest fires, the Hawaiian forest reserve system will not be properly administered. This is now the first need in forestry in Hawaii.

"Next, the Territory is a long way yet from having enough groves and plantations of trees of economically valuable species. This is equally true of government and of privately-owned land. Fuel supply in certain districts, fence posts, railroad ties, bridge timbers and other lumber for rough work, to say nothing of construction timber, will always be required in Hawaii. With the diminishing wood supply on the mainland, the price of lumber will certainly not recede. It may make considerable advances. It has been demonstrated that there are trees well adapted to local conditions that can supply at least part of the local demand. It needs no argument to show the wisdom of establishing plantations of such species on land that cannot profitably be used for agriculture.

FOREST FIRE SERVICE ESSENTIAL.

"Along with the other forms of forest protection it is essential that the Territory keep up an efficient forest fire service. It will continue the duty of the division of forestry to see that the present forest fire organization is maintained, and when necessary expanded.

"There are, as well, many lines of forest investigation which it should be the policy of the Board of Agriculture and Forestry to encourage. The introduction of species of trees new to the Islands, the experimental planting of temperate zone trees on the high mountains, and enough publicity and educational work so

that the public shall be kept fully informed as to the necessity for forestry in the Islands and its needs, are all matters that should have attention.

"The practice of forestry must always continue to be one of the important functions of the Territorial government. On the foundation that has been land in the past decade, may the division of forestry built strongly and well."

DIVISION OF ANIMAL INDUSTRY.

Honolulu, May 31, 1914.

The Honoarble Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I beg to submit herewith a report on the work of the division of animal industry for the month of May, 1914.

The routine work of the division, covering the inspection of imported live stock and the testing, inspection, tagging, branding and destruction of dairy animals for the eradication of bovine tuberculosis is appended in the itemized reports of the assistant territorial veterinarian.

I only wish to add that the new method of testing with tuberculin has continued to give excellent results, and that there can be no doubt that this method will be adopted the world over as soon as it has been demonstrated and officially accepted. This statement is based upon the fact that I was the first official delegated by the U. S. Department of Agriculture in 1891 to test tuberculous herds with a view to eradicating the disease, and have since that time studied and practiced all developments along this line as well as investigated all new methods and propositions pertaining thereto. I do therefore believe that, when I say that our present method, as employed only here and as developed here, will prove the one most feasible and most economic, I am entitled to sufficient confidence to warrant that the method be given a thorough test wherever the question of the eradication of bovine tuberculosis may present itself.

This statement is made with a view to influencing the members of the board to act favorably upon my application for authorization to officially represent the board at the Tenth International Veterinary Congress which holds its quadrennial meeting at London, England, August 3 to 8 this year.

At this congress bovine tuberculosis will be the main topic to be discussed. England has just passed a law carrying with it immense appropriations for the suppression of bovine tuberculosis, and my aim would be to demonstrate before the representatives of the numerous countries which will be represented there that this disease can be controlled and suppressed without any

such appropriations, at least for reimbursement to owners of diseased animals, as has been fully demonstrated in the Territory of Hawaii. Not alone has this fact been demonstrated, but the vastly more important one—that is, that the mortality of children from tuberculosis can be greatly reduced by elimination of milk from tuberculous cows from the public market—has likewise been proved, by official figures computed independently of this office, viz., the statistics of the Territorial Board of Health and the Anti-Tuberculosis League. That a majority of the States in the United States, as well as most foreign countries, should still adhere to the cumbersome and expensive old subcutaneous tuberculin test is in itself remarkable, but that the entire principle upon which the ultimate eradication of bovine tuberculosis must be based—that is, that the consumer must pay for the clean milk he demands—should entirely escape the observation of the legislators, is more astounding. It has been proved here that the consumer is perfectly willing to pay one cent per quart more for milk guaranteed free from tubercular infection, and it has also been demonstrated that this small sum is sufficient to reimburse the milk producer, as a whole, for all losses sustained on account of condemned cattle destroyed.

All that is required is education, to make the consumer demand clean milk, and demonstrate to him that through clean milk he will save a far greater amount than the increased cost of the milk through reduced or eliminated doctors' bills, medicine bills, undertakers' bills and in the general satisfaction of seeing healthy children and persons around him. Consequently, the large appropriations for reimbursements, which are now the principal stumbling blocks upon which most sanitary measures for the purpose are wrecked, will no longer be required.

Our present method of testing appears to us to be infallible, and has so far been sustained by every post-mortem eyamination made. While unknown up to the present in either the States or Europe, it is so simple that any practitioner may stumble over it at any time and assume the credit which should be due this board.

The same applies to the intradermal mallein test for glanders. The United States Bureau of Animal Industry has just promulgated a new regulation, changing from the old subcutaneous test to what is known as the ophthalmic test. While the latter is simpler, under favorable circumstances, than the old one, it is, according to our observations here, applicable only in 50 per cent of all cases, in summertime at least. On the other hand, we have developed here an entirely new test, along the same lines as the intradermal tuberculin test, and which seems also to be infallible. Its only drawback would appear to be that it is too searching, that even the slightest, apparently cured old nodule, in the lunge, for instance, causes a reaction. But surely no case of glanders can possibly escape it, and the reaction begins almost immediately

after injection, so that in most positive cases it is possible to come to a conclusion within two to four hours after injection. At the same time, the method is so simple that even a stable boy can interpret the results, if he has once seen it applied, or if it has only been explained to him. This test consists in the injection into the hide on the side of the neck of two to three drops of the official Bureau of Animal Industry mallein. The injection leaves a small, well-defined swelling, the size of a pea, which soon begins to enlarge, so that, within an hour or two, it has reached the size of a nickel or, in positive cases, a quarter. If the disease, glanders, is not present in the system the swelling will from then on remain stationary, or only enlarge very little more during the next twenty-four hours, remaining cold and not sensitive to touch. But if the disease is present the swelling will continue steadily to enlarge, sometimes at the rate of half an inch in diameter per hour, and at the same time becoming hot and extremely sensitive to touch. After ten to twelve hours the swelling may be six to ten inches in diameter and raised from one to three inches above the surrounding tissues, with sharply-defined margins. It is easily seen that such a reaction is vastly more diagnostic than one which, like the new official eye test, depends upon the quantity of tears discharged from the injected eye, especially when both eyes are already inflamed and running as a result of a cold, shipping fever, influenza, strangles, or simply irritation by strong sunlight or flies.

That our intradermal mallein test would be adopted, were it presented before the congress in question, there can be no doubt, the results obtained at the last outbreak of the disease in this Territory—the Waipio Valley outbreak—having demonstrated its value in 36 cases. In at least twenty of these cases the ophthalmic test could not have been used on account of sore eyes. However, both of these new methods of testing have been reported to the board in many previous communications, and the present statement was written only with a view to emphasize the importance of bringing them before the public in an effective manner. For this reason also has no publication been made in any veterinary or scientific magazine or periodical up to this date.

In regard to the interrogation from the Board of Supervisors; through Dr. Wayson, as to the statement made by me in my last report to the effect that the local milk inspection "is a farce," I have been requested not to publish my reasons for this statement, but allow the city and county physician to look into the matter, on the basis of such information as I might provide him with on the subject. I would therefore respectfully request that, for the sake of future coöperation, I be allowed to deal directly with the city and county physician on this subject in order to assist him in straightening up the situation, which without doubt requires both disciplinary and corrective measures. The very fast that infan-

tile tuberculosis has diminished to such an extraordinary extent in the only district where tuberculous milk has been barred from access to the nursery and dining-room should be an incentive to see to it that this beneficial result is not offset by a high infantile mortality from the many summer complaints among the babies and children due to filthy milk.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT FOR JUNE.

Honolulu, June 30, 1914.

The Honorable the Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I beg to report on the work of the division of animal industry for the month of June, 1914, as follows:

A number of complaints of disease among hogs continue to reach this office, and during the past month examinations have been made in a number of herds in Honolulu and vicinity. Of these may be mentioned Frank Andrade's and Charles Bellina's, both in Kuliouou; Kawahara's, in Waikakalua Gulch; a single case at the Girls' Industrial School, Moiliili; in all of which places post-mortems have been made, while at a number of other places the hogs are simply not doing well, while some small pigs are lost off and on.

In only one of these cases, the one at the Girls' Industrial School, were actual symptoms of hog cholera found on post-mortem, and as this was the only hog on the place or in the neighborhood the matter ended there with the disinfection of the premises. In none of the other cases that have come under observation, nor in any reported by practicing veterinarians, has it been possible to reach a definite conclusion as to the exact nature of the disease except faulty feeding, either too much swill, uncooked swill, too little green feed, too much rice bean or not sufficient quantities of nourishing food. There seems to be an idea among the hog raisers in Honolulu and vicinity that hogs can be raised on anything that may happen to be around and that it is waste of money to purchase feed for hogs. This idea undoubtedly originates with the swill-fed hog, which, under favorable circumstances, can be grown at very slight expense in comparison with the returns, and, while the careful and experienced hog raisers can produce pork by means of swill very cheaply, his success has led a number of absolutely inexperienced and ignorant Orientals to put everything they have into a small "hog ranch" and a swill wagon

and then think their fortunes are made. Swill—that is, the refuse and offal from kitchens of private houses, hotels, restaurants or military camps—is first-class feed for hogs when properly sorted or carefully collected, but failure to attend to this will always prove disastrous, especially in a hot climate. Furthermore, unless fed the same day it is produced, or at latest the following day, the swill should always be boiled or heated to the boiling point, during which process chopped green feed such as honohono or panicum grass should be added in equal quantities with the swill, or if this is very rich, that is, containing many meat scraps, the quantity of green stuff should be as two to one. A small amount of rice bran may be added, but to use this product as an exclusive feed or as the principal component of a daily ration has in my experience always given extremely unsatisfactory results. This is undoubtedly due to the high percentage of silicates (mineral matter) and the low actual feeding value.

As swill always contains a considerable amount of metal, especially solder and frequently the tin cans as well, and as fermenting swill soon begins to disintegrate the metal, producing various poisonous salts, there is always the danger of serious alimentary disturbances when swill is fed in large qauntities from this cause alone, and regardless of the danger of ptomaine poisoning. This is fully borne out by both symptoms and post-mortem lesions, exhibited in a majority of all fatal cases of disease among swill-fed hogs. Constipation is more frequent than diarrhoea, while paralysis, muscular trembling and blindness all indicate lead poisoning. On post-mortem gastro-enteritis is the principal symptom, extensive hemorrhagic areas along the large and small intestines with numerous small patches on the mucous membrane, but no button-like ulcers, as seen in hog cholera. The liver and kidneys are pale and shrunken, and without the small blood spots characteristic of hog cholera. Nor is the spleen enlarged. There are, however, many variations in both symptoms and lesions depending upon the different poisons which may develop in swill. It will therefore be seen that swill is an extremely risky food for hogs, and still there are several large hog ranches on this island, especially in the neighborhood of the large military establishments, that are simply coining money by means of swill-fed hogs. But all of them have lost large numbers of hogs before they learned how to use it judiciously, and especially learned not to over-feed and to take all of the precautions already mentioned. Besides these it is imperative to ascertain that no lye or soap-powder or any other chemical preparation used in cleaning dishes and pans reaches the swill barrel, especially if the tin cans reach it also. Next is the prompt collecting of the swill, as early in the morning as possible, and the sorting of it immediately when the pens are reached in order to remove all lemons, oranges or other acid fruit, as well as all

metal cans, colored labels and other injurious ingredients. Then the swill is placed in the clean heating tanks with the requisite amount of chopped green stuff and whatever other feed may be raised on the place for the animals. To this should be added a small amount of salt, charcoal, sulphur, antimony, etc., ae recommended as a preventive for hog cholera by the federal Bureau of Animal Industry, as follows:

Wood charcoal	1 lb.
Sulphur	1 lb.
Sodium chloride (salt)	2 lb.
Sodium bicrbonate	2 lb.
Sodium hyposulphite	2 lb.
Sodium sulphate	1 lb.
Antimony sulphid or black antimony	1 lb.

These ingredients should be powdered by passing through a coffee mill or in a large mortar, thoroughly mixed, and of the mixture a heaping tablespoonful should be added to the feed for every 200 pounds of hog in each pen. This prescription is repeated here because good results have been seen wherever it has been used, provided all the other precautions have been taken. But the medicine alone will not do it.

The fact remains, however, that hog cholera still exists on this island, and, even though there is not much of it or else that the hogs here have nearly all become immune, it cannot be advised to remove the restrictions against the shipping of hogs from this island to the others, for some time to come. Nor is there sufficient hog cholera to warrant the recommendation of serum immunization on a large scale so long as the price of serum remains anywhere as high as at present.

That the vigilance against the further introduction of virulent hog cholera from the Coast is still being guarded against will be seen from the appended letter from the federal live stock inspector in San Francisco, and which is self-explanatory. The fact should always be borne in mind that the virulence of the hog cholera microbe, like that of many other infectious and contagious diseases, varies so greatly in different localities that even if appearances justify the conclusion that a large percentage of the hogs here are immune to the infection *as it exists here,* there is no telling what degree of virulence they would be able to resist should a severe strain of infection accidentally be introduced. It is therefore reassuring to see the care with which our regulations are being enforced by the federal inspectors on the Coast, as testified to by Dr. Hicks' letter.

During the past month a hitherto unobserved and seemingly very serious condition was observed among the slaughtered cattle at the Hawaii Meat Company's slaughterhouse in Kalihi. The

condition consisted in a more or less pronounced oedematous (watery) swelling of the fatty tissue surrounding the kidneys, the lobes and lobules of fat being interspersed with sacks of crystal-clear fluid varying in size from a pea to a hen's egg or even larger. The kidneys themselves were somewhat enlarged, extremely pale, looking as if boiled. On section this condition appeard in the worst cases to extend throughout the entire organ, but were in others confined to the cortical substance only. The capsule was in all cases firmly attached to the organ, and no fluid was ever observed between them. The condition must therefore be diagnosed as acute nephritis and perinephritic oedema. No smell of urine could be detected even when considerable quantities of the fluid was collected and kept for one to three days, nor were any other lesions to be found anywhere else in the affected carcases. These were, on the other hand, all in the best possible condition and were, in fact, the fattest prime steers ever seen here, and this very fact proved to be the solution of the problem. It should only be added that outside of the usual shipping soreness and stiffness, the animals in question showed no ante-mortem symptoms of any kind, but looked bright and ate well.

Acute nephritis, when not due to the presence of a specific infectious disease, such as anthrax, tuberculosis or hemorrhage septicemia, is generally caused by irritation of the kidneys in their effort to eliminate from the body toxic principles, whether generated in the body itself or introduced with poisonous plants, fermented food, young shoots of trees containing resin or tannin, but may be due to too highly nutritious food, rich in protein, such as cowpeas, vetches, clovers and other legumes. Cold also seems to be an important factor, especially cold driving rains, which are bound to accelerate the tendency to the development of nephritis if any of the previously mentioned irritating factors are present. In order to come to a definite conclusion a visit was made to the district where the cattle in question were shipped from. Especial attention was given to the fattening paddock out of which these animals had been selected, but, as already stated, none seemed to be otherwise but in perfect health and rolling fat. There had, however, been unusually heavy rainfall all through the spring months, with the result that feed was more than abundant, allowing the cattle to gorge themselves without moving any distance in search of food and, as it rained every day, they did not even have to go to the watering troughs, but simply ate water. The pasture in question was very rich in legumes, especially the sweet yellow clover and a variety of highly nutritious imported grasses.

This condition was exactly what was expected and accounted, in connection with the cold driving rains, fully for the affected kidneys as observed on the killing floor. The animals were simply so loaded up with the rich albuminous feed that their kid-

neys were overworked, the other means of excretion as promoted by exercise being excluded by the great abundance of feed.

The remedy was therefore simple enough—to remove the animals from the rich pasture for a week or so before shipping them to market, and to herd the remaining ones away from the richest parts of the pasture and let them work their way back for the sake of exercise.

It should be mentioned that the legumes only seem to have this irritating effect on the kidneys when only half or three-quarters ripe. As soon as they are fully ripe they no longer affect the animals, besides which they are less succulent and therefore less liable to cause gorging. Since the above recommendations were carried out no cases have been observed on the killing floor.

Bovine Tuberculosis Control.

As reports have reached this office about actually filthy milk—that is, milk with dirt in visible quantities on the bottom of the containers—it has been decided to make a thorough investigation of each individual dairy in the entire district and to prepare a report on the same.

At the same time a bacterial count is being made of samples of milk obtained from dairies in unsatisfactory sanitary condition, with a view to, if possible, submitting all the daries to this most searching test.

The report of the assistant tennitorial veterinarian herewith appended shows the further progress in the elimination of the tuberculous cow from the local dairy herds, but, as he states, the time will soon arrive when more vigorous steps will have to be taken in order to make a complete clean-up, without which the disease will never be suppressed.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, June 30, 1914.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to report as follows for the month of June, 1914:

Tuberculosis Control.

The following dairy stock have been tested during the past month:

	T.	P.	C.
F. Fugita	2	2	0
K. Shimidsu	1	1	0
T. Katsuko	5	5	0
F. de Mello	6	6	0
K. Okomoto	4	4	0
Ewa Boarding House	1	1	0
C. A. Vasconcellas	5	5	0
S. Mendonca	2	2	0
H. Dias	1	1	0
A. Ornellas	1	1	0
J. T. Ornellas	1	1	0
F. A. Ornellas	1	1	0
F. Dado	17	17	0
M. K. Young	1	1	0
W. E. Wall	17	16	1
A. W. Seabury	1	0	1
George Holt	29	25	4
A. F. Cooke	8	8	0
Kamehameha Schools	1	1	0

From the above tabulated list it will be seen that 104 head of dairy stock received injections of tuberculin, out of which number 98 passed and six were condemned and branded.

It is interesting to note that W. E. Wall's imported Holstein cow gave a reaction to this last test, this being the first time it has shown a reaction since it was condemned June 21, 1913, nearly a year ago, during which time she received three intradermal injections with apparently no result. On the first test, June 21, 1913, the sub-caudal fold was injected intradermally and the resulting swelling was clearly defined and typical of reactions in that part of the body. The day before I make my examination there had been a marked constitutional reaction which was observed by the owner. Since this time sub-caudal injections have been made at regular intervals with no results.

On the 10th of the month this cow was again subjected to the intradermal test, but after the improved method, i. e., injection into the skin of the lower eyelid, and this time she gave a distinct reaction. From the size and appearance of the swelling, which was smaller than the first reaction, our experience leads us to conclude that the disease had advanced to some degree and may even be generalized. The physical appearance of the animal, which has lost considerably in flesh, would seem to bear out such a supposition.

The cow condemned for A. W. Seabury was one of the Rose Davison dairy stock and the size and appearance of the reaction, together with the physical condition of the animal, would indicate that the disease is pretty well generalized.

George Holt's dairy has again shown a number of diseased animals. Only two months ago nine cows were condemned and branded out of a total of 27 head. This brings the total number of recently condemned animals from this dairy up to 13 head, all of which have been sent to Mr. Holt's ranch at Maili, where they can wander unrestrained and spread the infection all over the district. On a recent trip past Maili, three of these condemned animals were noticed grazing along the road. It would seem that the time is now at hand when this division should be given absolute authority and control over all condemned animals in order that they may be disposed of at once through the different slaughter-houses and not allowed to disseminate the disease throughout the island. It is our opinion that without such authority, control and eventual eradication of bovine tuberculosis within this Territory is practically impossible.

Importations of Live Stock.

June 1—S. S. Sierra, San Francisco: 17 crates poultry.
June 2—S. S. Lurline, San Francisco: 21 crates poultry; 2 dogs, Mrs. Kirkaldy; 4 crates poultry, Kahului, Maui.
June 9—S. S. Wilhelmina, San Francisco: 23 crates poultry; 1 dog, M. P. Morgan.
June 15—S. S. Ventura, San Francisco: 14 crates poultry.
June 16—S. S. Manoa, San Francisco: 35 crates poultry; 2 crates poultry, F. F. Baldwin, Kahului, Maui.
June 17—S. S. Georgian, Seattle: 205 butcher hogs, 28 hogs (breeding), 7 horses, 14 mules, 12 cows, 1 calf, 2 bulls, A. L. Macpherson.
June 23—S. S. Matsonia, San Francisco: 18 crates poultry, 1 crate swans, 1 crate pheasants, A. Robinson; 1 crate monkeys, W. F. X. Company; 1 monkey, Geo. Ahlborn.
June 23—S. S. Honolulan, Seattle: 1 Jersey bull (pure-bred), 1 Durham bull (pure-bred), S. M. Damon; 10 mules, 1 grade Durham bull, Schuman Carriage Company.
June 29—S. S. Manchuria, Orient: 1 dog, H. A. Hiscox.
June 20—S. S. Sierra, San Francisco: 3 crates poultry.
June 30—S. S. Lurline, San Francisco: 24 crates poultry

Respectfully submitted,

L. N. Case,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, June 30, 1914.

Board of Commissioners of Agriculture and Forestry.

Gentlemen: I respectfully submit my report of the work performed by the division of entomology for the month of June, 1914, as follows:

During the month 35 vessels arrived at the port of Honolulu, of which 24 carried vegetable matter and one vessel molding sand.

Disposal.	Lots.	Parcels.
Passed as free from pests.....	1308	20,071
Fumigated	1	1
Burned	48	48
Returned	1	1
Total inspected	1358	20,121

Of these shipments, 19,892 packages arrived as freight, 112 packages as baggage of passengers and immigrants, and 117 packages by the U. S. mail.

RICE AND BEAN SHIPMENTS.

During the month 34,981 bags of rice and 3521 bags of beans arrived from Japan which were allowed to land after thorough inspection.

PESTS INTERCEPTED.

Twenty-nine packages of fruit and 15 packages of vegetables were found in the baggage of passengers and immigrants from foreign countries, all of which, being prohibited, were destroyed. One hundred and six boxes of apples from the Pacific Coast had to be overhauled on account of having been packed in moth-infested boxes, the fruit not showing any infestation. One box of plants from California was found infested with the common greenhouse whitefly and the plants were fumigated before delivery.

One package of plants arriving from Manila without a permit from the Federal Horticultural Board was returned to the shipper.

During the month two packages of medicinal worms arrived, one by parcel post, in which the worms were very much alive; in fact, one moth had almost emerged from the pupa. This shipment was identical with the one destroyed in the month of February, but no instructions accompanied the sending. The other package consisted of a tube made out of a joint of bamboo, sawed

into at one end, making a perfect mailing tube, and found in the baggage of a Japanese at the immigrant station. It contained 12 large lepidopterous larvae which we found had been baked; however, we confiscated the lot so as to discourage the worm-eating habit for the cure of consumption, thereby lessening future importations if possible.

BENEFICIAL INSECTS.

Dr. Silvestri sent six tin tubes containing dungfly material, but unfortunately the shipment arrived in very bad condition, all beetles being dead. Mr. Muir sent a box of soil containing larvae and pupae of the Japanese rose beetle, supposed to be parasitized. This box was examined at the Planters' station with Mr. Swezey present and, after removing all the larvae and pupae, the soil was fumigated and destroyed by burning.

The breeding and distribution of the various parasites from Silvestri has continued during the month. Owing to Mr. Bridwell's trip to Africa, this work now falls to me with one assistant. Our endeavor is to keep the parasites breeding until such time as we are positive that their establishment is a certainty. We have liberated 11,190 parasites during the month, and we are devoting our efforts especially to the distribution of the *Opius humilis,* which appears now to be the most promising. We have been able to rear this parasite from guavas and other fruits collected in the vicinity where the species was liberated a month or so ago. We have also been breeding the two Philippine parasites for hornfly and housefly which Mr. Fullaway brought with him on his return from the Philippines. About 1000 of each species have been liberated during the month.

HILO INSPECTION.

Brother M. Newell reports the arrival of nine steamers at the port of Hilo, six of which brought vegetable matter consisting of 142 lots and 2787 packages; all being free from pests, they were passed. On account of the usual ten days' retreat for Brother Newell, I sent Mr. D. B. Kuhns to Hilo to look after the work during that time.

INTER-ISLAND INSPECTION.

During the month of June 62 steamers plying between the islands were attended to and the following shipments were inspected and passed:

Plants	96	packages
Taro	660	bags
Fruit	28	packages
Vegetables	14	"
Awa root	2	"
Total passed	800	

The following packages were refused shipment on account of being either infested with pests or having objectionable soil attached to plants:

Plants	7	packages
Fruit	6	"
Vegetables	2	"
Total refused	15	"

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

Honolulu, June 30, 1914.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the division of forestry for June, 1914:

FOREST RESERVE FENCING.

During the early part of the month, as one result of my visit to Kona in May, definite arrangements were completed with Messrs. F. R. Greenwell and John A. Maguire for the fencing of the Waiaha Spring forest reserve boundary in North Kona, and part of the material for doing the work forwarded. Arrangements were also consummated for the building of a forest fence on the land of Wailupe in Palolo Valley, Oahu, that will protect the forested ridge between Palolo and Manoa valleys.

Satisfactory reports have come in that progress is being made on the other forest reserve fences now under way.

FOREST LAND TRANSFER.

Under the date of June 13, 1914, a formal agreement was signed by the Governor and the Commissioner of Public Lands,

acting for the Territory, and by the Honorable George R. Carter, whereby the latter transfers to the Board of Agriculture and Forestry for a period of five years a tract of 132 acres of forest land, on the slopes of the mountain at the head of Manoa Valley, Honolulu, for forest purposes. The land forms a part of the Honolulu Watershed forest reserve. The object of turning the custody and control of it over to the government is that, along with the government land at the head of Manoa Valley, it may be cared for by the Territorial division of forestry in accordance with the principles of practical forestry. Under Chapter 28 of the Revised Laws of Hawaii the government may accept such transfers of lands, under conditions to be fixed by the board. As long as an area of forest remains exclusively in the control of the government, it is, upon demand, exempted from taxation. The amount of the taxes remitted on this Manoa land is not great, Mr. Carter's idea being rather to signify in a public manner his willingness to coöperate with the Board of Agriculture and Forestry and his belief in its forest work.

One other similar transfer has already been made in Hawaii. This was in November, 1906, when certain lands in the Koolau district on Maui, leased and owned by the Alexander & Baldwin interests, were turned over to the government for a term of seventeen years. The action of ex-Governor Carter in regard to his Manoa Valley land is of especial importance, as it helps to confirm and establish a precedent. In later years, when the Territorial government is equipped with an administrative force adequate to the task of properly caring for its forest reserves, the present transfer may be of assistance in helping to bring other owners of private forest lands into line.

ISSUE OF PERMITS.

At the end of June several permits, good for a period of three months, were renewed to persons temporarily occupying portions of the tract named Kalawahine, in the Honolulu Watershed forest reserve. In return for this privilege the licensees pay a fee to the government and agree to turn out to fight forest fires should any start in their neighborhood from any cause whatsoever.

TRIP TO MAUI.

From the 15th to the 27th of June I was on the Island of Maui, engaged in a general inspection trip that included several districts. Landing at Hana, I first visited and inspected the forest fence built for the board on the boundary of the Hana forest reserve above Nahiku. This fence, together with the sections of it built jointly by the board and the adjoining private owners, now shuts off and protects the native forest from Puu Hinai to Maka-

pepe Gulch to the north and west of which the forest is already protected voluntarily and under government lease requirements by the East Maui Ditch Company. The fencing above Nahiku was done for the government by the Nahiku Rubber Co. under the personal supervision of its manager, Mr. W. A. Anderson. It is a satisfactory piece of work.

Next, in company with Mr. R. A. Drummond, I worked along the forest line at the south end of the Hana district and across Kipahulu and Kaupo. The object of this portion of the trip was to determine the points between which forest fences are required, and in Kaupo and Kipahulu to lay out the boundary of a forest reserve. These two districts contain the one large section of government forest land in the Territory needed for stream protection that has not yet been brought into the forest reserve system. A report recommending the establishment of the Kipahulu forest reserve will shortly be submitted to the board for its approval.

Crossing Kahikinui, I then followed and inspected the recently-repaired fences around the Polipoli Spring section of the Kula forest reserve. I am glad to report that this fence, which for a considerable time had been in bad condition, is now in excellent shape, new posts having been set and the wires restrung. The upkeep of the Polipoli fence is required by the license to use a portion of the water from Polipoli Spring, held by Dr. J. H. Raymond.

While on the mountain I also rode the newly-constructed forest fence on the boundary of the Kula forest reserve, built under the requirements of government lease held by the Cornwell Ranch. This fence is substantially built of mamane posts, five wires. It runs from the corner of the Polipoli section across the face of Mt. Haleakala to the northern boundary of the government land of Waiakoa. Mauka of the fence the land is of such character as to be judged of but small value for grazing. It was accordingly set apart as a forest reserve with the expectation that in time it could be made to grow conifers and other temperate zone trees. It is to be hoped that steps to start such planting can be taken before very long.

In addition to the fence building the Cornwell Ranch is also under obligations to plant trees on the government grazing land it has under lease. The three plots so far started were visited by me and the planting examined. Eucalyptus are the trees used. The little trees are starting well, the percentage of loss in the planting being very small. Several additional plots will soon be put in to bring up to date the number of trees required to be planted.

On subsequent days I inspected the fence built for the board on the boundary of the Waihou Spring forest reserve near Olinda, under contract by the Haleakala Ranch Co.; had a look at the federal experimental tree lot No. 1, higher up Mt. Halea-

kala; visited the experimental tree-planting plots above Kailiili, Makawao, and, in company with the man now in charge there, went over the proposition of thinning out the algaroba forest on the government lands on the beach at Kihei.

The fence at Waihou is satisfactorily completed. In the mountain tree lot I found a dozen or more specimens each of three different pines and of incense cedar, firmly established and growing vigorously. Some of the pines were between 6 and 7 feet in height. In this plot are also various eucalyptus and other forest trees set out under the direction of this division during the past six years. Although meager in number, the success of these individual trees shows that it is feasible to grow such temperate zone species. Later, when it is found possible to undertake such experimental planting on Mt. Haleakala in a more systematic way, much benefit should result from it.

The experimental plantation of eucalyptus above Kailiili is in charge of Mr. W. Hannestad, under a coöperative arrangement with the Maui Agricultural Company. A considerable variety of species new to Hawaii have been planted here in the past two years, to be tried out. The results so far make this experiment a very satisfactory one.

REPORT FROM THE NURSERY.

Mr. Haughs' report for June, which as usual is transmitted herewith, gives the details of the section of the division of forestry's work dealing with tree planting and the distribution of seedlings. The item of especial interest this month is that a good stock of little trees is being got ready for the planting season, next autumn.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, June 30, 1914.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of June:

Nursery.

Distribution of Plants.

	In Seed Boxes.	In Boxes Transplanted.	Pot Grown.	Total.
Sold	2,250	200	258	2,708
Gratis	13,000	3,948	1,263	18,211
	15,520	4,148	1,521	20,919

Collections.

Collections on account of plants sold amounted to	$15.40
Rental of building, Nursery grounds, for month of May	35.00
Total	$50.40

Plantation Companies and Other Corporations.

The distribution of plants under this heading amounted to 250 in seed boxes and 1300 in transplant boxes; total, 1550.

The propagation of large numbers of trees for the coming planting season is now going on and a big stock will be on hand. This work will keep all hands busy for some time to come.

Makiki Station.

At this station the new introductions are being tested and quite a number of very promising species are now almost ready to plant out.

Honolulu Watershed Planting.

The two men employed to hoe and care for the trees recently planted on Sugar Loaf and adjoining lands have been doing regular routine work along these lines.

Advice and Assistance.

The writer has been asked to make calls and give advice as follows:

Visits in and around the city, 6; advice asked by telephone, 8; advice asked at Nursery, 11; advice asked by letter to other islands, 4.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF HYDROGRAPHY.

Honolulu, Hawaii, July 11, 1914.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the division of hydrography during June, 1914, is submitted:

OAHU.

While leeward Oahu has had a comparatively dry month, the Koolau range has received more than its usual amount of rainfall, with the result that reservoirs along the leeward side of the range are well filled.

In addition to routine field work, the construction work in connection with the coöperative stream-gaging stations was well advanced. One clock register stream-gaging station on the lower south fork of the Kaukonahua and one relock register ditch-gaging station for the U. S. Army were completed, and two of the three clock register stream-gaging coöperative stations for the Kahuku Plantation Company on the main and middle branches of the Malaekahana stream were finished. It is expected that the remaining three coöperative stations for the Kahuku Plantation Co. and the Laie Plantation Co. will be completed during July.

KAUAI.

June was an unusually wet month, and the island generally received an abnormal amount of rainfall. On June 22 heavy rainfall was general all over the island, and the Wainiha river was reported by Mr. Menefoglio as the highest he had ever seen it.

A minimum amount of routine gaging work was done on account of the heavy construction work being accomplished. The Waioli stream (government water) clock register measurement station at an elevation of 750 feet above sea level was completed. This station necessitated the construction of a three-mile trail, which required the labor of four laborers and one foreman for a period of 22 days.

During July a clock register stream-measurement station will be constructed on the Wainiha river above the power line ditch intake, at an elevation of about 750 feet above the sea level. No trail work will be required for this station.

June 3 to 5: The superintendent made reconnaissance investigations of the Waioli and North Wailua valleys, and definite locations were selected for station sites.

MAUI.

Wet weather conditions continued during June, but there was less rainfall than during the previous month.

Twenty stream measurements were made during the month at medium or flood stages. Four new Stevens clock registers were placed at stations previously prepared to receive them.

The month was utilized almost entirely in obtaining stream measurements which improved rating curves.

HAWAII.

From June 17 to 22 an examination was made of the south branch of the Wailuku river near Hilo at the request of the Attorney General, in connection with the Hilo Boarding School ditch controversy. The results of this investigation have been reported to the Attorney General of Hawaii for his use when the case comes to trial at Hilo. Floods prevented the completion of this investigation, and a further examination will be made as soon as the Wailuku drops to a normal stage, probably during July.

EXPERIMENTAL INVESTIGATIONS.

Tentative arrangements have been made with the director of the H. S. P. A. Experimental Station to undertake an investigation of ditch losses, evaporation, water duty under different conditions of soils, etc. The work will be started at the experimental substation at Waipio near Waipahu, Oahu. The H. S. P. A. will furnish all labor, materials, etc., while this division will furnish the technical help to carry out the hydrometric work. After the work has been started at Waipio it is hoped that it can be extended to plantations on all islands under differing conditions of soil, climate, crops, etc.

The first work to be taken up will be the investigation of ditch seepage soil and distribution losses, and some evaporation experimental work which will be started during July.

It is believed that the data obtained will open the way to greater efficiency and economy in water utilization in Hawaii.

STREAM-GAGING STATIONS MAINTAINED.

Island.	May 31.	Established During Month.	Discontinued During Month.	June 30.
Kauai	27	1	0	28
Oahu	44	4*	0	48
Maui	43	2	2	43
Kona, Hawaii	1	0	0	1
Total	115	7	2	120

* Registers not yet put in.

Of the above stations, the following are clock register or continuous record stations: Kauai, 12; Oahu, 15; Maui, 20; Hawaii, 1. Total, 48.

Very respectfully,

G. K. LARRISON,
Snperintendent.

ALFALFA—A PROMISING FORAGE CPOP FOR HAWAII.

By WILLIAM H. MEINECKE, Class of 1913.

(Concluded.)

SUMMARY.

Alfalfa is not only an excellent fodder plant, but it is very good as a rotation crop with corn and sorghum. It will grow well on almost any soil provided it is well drained and free from acids.

The usual amount of seed sown broadcast is 20 to 30 pounds per acre, but 15 pounds of prime seed should be sufficient. If drilled, less seed is needed.

Weeds are first of all the worst enemies of the young alfalfa seedlings, but by judicious methods of preparing the land, their growth can be reduced to a minimum.

Cut worms are the worst and so far the only important enemies of the Hawaiian alfalfa crop, but they may be controlled by drowning and poisoning.

Weeds and cut worms are no longer troublesome after the crop has once become well established.

The field requires little care after the first few months and will continue to produce high yields of fodder once in three to five weeks, according to the variety and season.

While the cost of production for the first year is very high, subsequent crops which continue maturing every month for several years will more than make up for it and produce large profits.

Of the varieties under test at the College of Hawaii, the Utah strain of the Chilean proved to be by far the best, with the Kansas variety a good second.

The Arabian variety did not yield as well as the others, but it matures in from 17 to 21 days, and is very succulent and tender. Where there is ample moisture and a desire for frequent harvests, this variety will prove to be very desirable, especially for feeding hogs and chickens. On the other hand, this variety is very susceptible to a fungous root rot and it is not recommended where this disease is likely to be present.

One acre should produce eight to 10 tons of green fodder per

month at a cost of $18 to $20 per acre (including weighing) if harvested with the sickle. The use of the machine mower and horse cultivator will aid greatly in reducing the cost of production.

Every dairy should have alfalfa and corn or sorghum fields. These crops yield heavily at low cost and make very good mixtures for the silo and feeding ration.

Cows are especially fond of alfalfa, sorghum and corn, and judicious feeding will prevent them from getting "off feed."

Alfalfa has done well in all parts of the United States and in Hawaii.

The average annual yields of the common variety in the United States is three to five tons of dry hay per acre from three to five cuttings. In California the average annual yield is five tons of hay per acre from five to seven cuttings, though 10 to 12 tons have been obtained from nine cuttings on the best alfalfa lands.

Hawaii can produce an equivalent of 10 tons of dry hay per acre during the first year and still more than that during the second. Nine months from the time of seeding the College of Hawaii experimental plot (common Utah) has produced an equivalent of 26.10 tons green or 5.22 tons of hay from six cuttings.

Our last crop of the Utah strain yielded 9.24 tons of green fodder or 1.85 tons of dry hay per acre. Taking this as a basis, and allowing for 12 cuttings, one acre should and undoubtedly will produce in one year (second year's growth) 110.88 tons of green feed, or 22.20 tons of hay. Half this yield would be profitable.

CONCLUSION.

Alfalfa is an extremely difficult and expensive crop to establish, but owing to its long life and high yields and feeding value, it is in the end very profitable.

The discouragements which accompany the establishment of the crop are very trying, but success requires only a few months of persistence and a "never-say-die" spirit on the part of the grower.

This crop, together with corn—which has yielded as high as 94 bushels of grain per acre and an average of from 70 to 80 bushels at the College of Hawaii—is worthy of attention and trial by every stock feeder in the Territory.

W. H. MEINECKE.

May 31, 1913.

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U. S. D. A.-B. P. I. Bul. 131.

Innoculation.

Cal. Sta. Cir. 87.
Farmers' Bul. 374.
Haw. Sta. Bul. 23.
Idaho Sta. Bul. 66.
Ind. Sta. Bul. 27.
Mich. Sta. Bul. 271.
Mo. Sta. Cir. 40.
Nev. Sta. Bul. 120.
S. Dak. Sta. Bul. 120.
Tenn. Sta. Bul. 92.
Wash. Sta. Bul. 2 Sp. Ser.

A LITTLE-KNOWN FIG-TREE.

Familiar in Egypt under the ancient name of "Sycomore," the interesting species of Ficus known as *F. sycomorus* has for ages been renowned for its hard-wood and for its pleasant and nutritious fruit. This fruit, which the Arabs call "fig of Pharaoh," does not possess so fine a flavor as the figs of the species Carica, but it is nevertheless very agreeable to the taste, sweet, leaving an after-taste resembling that of coconut. The pulp is firm and juicy.

In Egypt, the "Sycomore" is not cultivated in orchards, but it is sometimes found growing in avenues. It forms a useful shade tree near to houses and particularly for wells to provide shade for the animals that work the native chain pump.

The geographical range of this species comprises Egypt, Abyssinia and Arabia. The tree is susceptible to cold weather. Mon. Charles Henry, ex-gardener-in-chief to the Khedive, writing in L'Agronomie Coloniale (October 31, 1913), believes that the tree would thrive throughout the tropics, particularly in sheltered localities. Specimens already exist in the French colonies in West Africa.

The propagation of *F. sycomorus* presents no difficulties and is done by means of cuttings 40 to 50 cm. long. In three years the branches are well formed and the young trees are ready to be planted out.

The flower of this species is different to the other representatives of the genus, for a description of which the reader may refer to Mon. Henry's article.

During each year after the tree has come in bearing, the bark of the larger branches is chipped off to quicken fructification. This treatment is analogous to "ringing."

The ripening of the fruit is stimulated by caprification—that is, by boring a small hole into the fruit. Latex is exuded and the wound heals. Ripening follows three or four days after caprification.

The average harvest yield is 660 lbs. of fruit per tree.

It should be pointed out that all "Sycomores" are not of equal value. Varieties exist but have not so far been determined; though by communicating with the writer mentioned above it would be no doubt possible for those interested in this useful tree to obtain further detailed information.—Agricultural News.

Board of Agriculture and Forestry

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The United States Geological Survey topographic map of Kauai is also on sale, and copies will be mailed on receipt of 50 cents.

The records and maps of this division are available for inspection by any one who desires information relative to water resources, topography, etc. Blue print copies of hydrographic data relative to any stream, ditch, spring, etc., which may be under observation by this division will be mailed free of charge on request.

This division will also make ditch seepage losses and utilization investigations when the actual cost of the labor, materials, subsistence, transportation, etc., of such investigations is paid by those benefited.

G. K. LARRISON,
Superintendent of Hydrography.